was finished was his constant aim, and his zeal was generally equalled by his success. He undertook very little from which he did not get some positive result, for his method was to work tentatively, and to relinquish the inquiry if it did not appear promising. In this way he took up what he regarded as the greatest work of his life, the determination of the parallax of stars of the second magnitude. In this investigation he showed the keenest interest, and much of the work was performed not only under his directions, but actually by himself, and the Royal Society, recognising the importance of this work, and also Prof. Pritchard's earnest and protracted devotion to astronomy, awarded him the Royal Medal last year. W. E. P.

NOTES.

THE annual meeting of the Royal Society for the election of Fellows was held in their apartments at Burlington House on Thursday last, when the following gentlemen were elected into the Society:—Prof. William Burnside, Prof. Wyndham R. Dunstan, William Ellis, Prof. J. Cossar Ewart, Prof. William Tennant Gairdner, Ernest William Hobson, Sir Henry Hoyle Howorth, Edwin Tulley Newton, Charles Scott Sherrington, Edward C. Stirling, John Isaac Thornycroft, Prof. James William H. Trail, Alfred Russel Wallace, Prof. Arthur Mason Worthington, Prof. Sydney Young.

AMONG Fellows of the Royal Society whose names appear in the list of birthday honours are Dr. B. W. Richardson, F.R.S., Capt. A. Noble, C.B., F.R.S., and Mr. Charles Todd, C.M.G., F.R.S. Dr. Richardson, who has been knighted, is well-known as a writer on hygienic and medical subjects, and Capt. Noble, who is created a Knight Commander of the Bath, is an authority on explosives. Mr. Todd has been promoted to Knight Commander of the Order of St. Michael and St. George. In the announcement of the honour that has been conferred upon him, he is described as Postmaster-General and Superintendent of Telegraphs of the colony of South Australia. It should be pointed out, however, that Mr. Todd is also the Government Astronomer at Adelaide and that he has published numerous contributions to meteorology and astronomy. It almost appears as if Mr. Todd's standing as an astronomer and man of science has been wilfully avoided, for we can hardly think that the Colonial Office is in blissful ignorance of his scientific work. The only scientific man in Government employ whose services have been recognised is Mr. David Morris, the assistant director of the Botanic Gardens at Kew, who has been made a Companion of the Order of St. Michael and St. George.

THE ladies' *conversazione* of the Royal Society was held last night in the Society's apartments at Burlington House.

THE President of the Society of Antiquaries has issued invitations for a *conversazione* at Burlington House, on the 14th instant.

IT is expected that, at the meeting of the Royal Astronomical Society to-morrow evening, Prof. Thorpe and Mr. Alfred Taylor will give an account of the expeditions to observe the recent total solar eclipse. Prof. E. E. Barnard, of the Lick Observatory, will also be present, and will address the meeting.

THE annual *conversazione* of the Society of Arts will take place at the Imperial Institute, South Kensington, on Friday, June 30, from 9 to 12 p.m.

ON June 26, 1793, died Gilbert White of Selborne, a man who has done perhaps more than any other of his countrymen to awaken a taste for natural history and encourage its pursuit. A writer in the June number of *The Zoologist* gives a sketch of the life of this naturalist, and points out that now is the time to erect some kind of monument to his memory. The sole memorial which at present exists is a marble tablet on the chancel wall of the church in which he officiated. This is not as it should be. A marble bust was erected to Richard Jefferies, in Winchester Cathedral, a few months after his death, while Gilbert White, also a Hampshire man, has remained unhonoured for a century. As to the claim of the author of the "Natural History of Selborne," to a memorial there can be no doubt, and it is to be hoped that a committee will be formed to take the matter in hand, and carry it to a successful termination. Unfortunately no portrait of Gilbert White is in existence, so there is a difficulty in designing a monument with a statue unless it be decided to allow the sculptor to carve the features from his imagination. Under these circumstances, the preferable plan would be to erect a monument emblematical of the avocation of a naturalist, such, for example, as the monument to the naturalist, John James Audubon, which was unveiled at New York on April 26 last. Whether the monument should be erected at the little village of Selborne, or in the borough-town of Petersfield, ought soon to be decided. We trust that when an appeal for funds is made, there will be a hearty response to it.

WE regret to have to record the death of Dr. Carl Semper, Professor of Zoology and Comparative Anatomy in the University of Würzburg, on May 29.

IT has been resolved by the Government of India that in the future two-thirds of the officers of the Geological Survey shall be primarily engaged in the explorations necessary for the completion of the geological map, and the remaining third on the investigation of mineral fields. According to the *Times*, the exploration in the latter case will be confined to such preliminary examination as may be necessary to supply general information regarding their character and extent to capitalists and promoters, upon whom will rest the responsibility for more detailed prospecting.

AN International Electrical Congress will be held in connection with the Columbian Exposition, at Chicago, in August. There will be three sections, one dealing with pure theory, another with theory and practice, and a third with practice only. Papers are solicited upon electrical subjects, and should be sent to Prof. T. C. Mendenhall, Washington, D.C., not later than August 1. Electrical standards and units will be considered by a body consisting of those specially designated as representative delegates from the various Governments.

THE second meeting of the International Maritime Congress is to be held in the rooms of the Institution of Civil Engineers next month. The chief object of the congress is the reading and discussion of papers on matters relating to the promotion and security of maritime traffic and commerce. After the meeting it is proposed to visit the docks along the Thames, and some of the provincial seaports.

THE annual general meeting of the Institution of Civil Engineers was held on May 30. Before proceeding to the ordinary business, H.R.H. the Duke of York was elected an honorary member. The ballot for Council resulted in the election of Mr. Alfred Giles as President; of Sir Robert Rawlinson, Sir B. Baker, Sir Jas. N. Douglass, and Mr. J. W. Barry, as Vice-Presidents; and of Dr. W. Anderson, Mr. A. R. Binnie, Sir Douglas Fox, Sir Chas. A. Hartley, Messrs. J. C. Hawkshaw, C. Hawksley, Alex. B. W. Kennedy, Sir Bradford Leslie, Mr. J. Mansergh, Sir Guilford Molesworth, Mr. W. H. Preece, Sir E. J. Reed, Messrs. W. Shelford, F. W. Webb, and W. H. White as other Members of Council.

THE weather during the latter part of last week continued particularly dry over the greater part of these islands, owing to an anticyclone which lay over the Atlantic embracing most part of the country, but shallow depressions formed over Scandinavia and the Baltic, and under their influence some slight showers occurred in the extreme north and north-west. At the end of the week however the anticyclone temporarily shifted somewhat southwards and eastwards, thunderstorms became prevalent in the north, east, and south-east, and rain fell at most stations, amounting to over half an inch in the north-east of Scotland, but generally speaking the amounts were slight elsewhere; on Tuesday, the 6th inst., the anticyclone again embraced the whole of the southern portion of our islands. During the first part of the period frost occurred on the ground in many parts of England; and although the maximum temperatures have not been high generally, they have at times exceeded 70° in different parts of Great Britain, but in the extreme north the highest readings have generally been below 60°. The *Weekly Weather Report* of the 3rd inst. showed that the temperature was slightly below the average in some of the wheat-producing districts, and rather above it in the grazing districts. Rainfall was below the mean everywhere; the deficiency since the beginning of the year ranged from 2·3 inches in the north of Scotland to 6·0 inches in the west of Scotland. Bright sunshine was only above the average in the west of Scotland, the south-west of England, and the Channel Islands. In the latter district the duration was as high as 70 per cent. of the possible amount.

THE Meteorological Council have issued the fourth volume of Hourly Means of the readings obtained from the self-recording instruments at their observatories for the year 1890. The tables contain hourly means or totals for periods of five days, months, and for the year, and, with the exception of the wind observations, daily values are also given. Breaks in the hourly readings are rare, but occur at times from failure of photography, stoppage of clocks, and in the case of the wet-bulb thermometer, owing to frost; such cases, however, are carefully examined and the losses can usually be made good by interpolation, with a very near approach to accuracy.

SIR C. TODD has published the meteorological observations made at the Adelaide Observatory and other places in the colony during the year 1890. The maximum shade temperature at Adelaide was 105° on January 18, and the minimum 34°·2 on July 17; the greatest range in 24 hours was 38°·8 on January 4th, and the lowest temperature on grass was 25° on July 17. Throughout the colony generally very oppressive weather was experienced in January and February, with heavy tropical rains over northern areas, and the winter also was very wet. The extraordinary rainfall (especially in the first three months) was the chief feature of the year, which was the wettest on record, some stations having a fall of over 100 inches.

A CORRESPONDENT calls our attention to a peculiar phenomenon witnessed at Aboyne on the morning of May 26. "Stretching along the falls of Morven and Culblean, and slightly below the top of the former, was a magnificent ribbon, exhibiting the full spectrum of colours from red to violet—in fact, a perfect 'rainbow,' but without the slightest curve. The sun was shining brightly in the east, while it was raining on Morven, which, of course, accounts for the colours; but I am unable to account for the absence of the arch." The lowest part of the ribbon showed the least refrangible colours.

A NUMBER of experiments to determine the temperature of the steam arising from a boiling salt solution have been made from time to time, but the conclusions have frequently been of a conflicting character. The difficulty of arriving at trustworthy results lies in the fact that the walls of the steam-chamber must be above 100° C., and yet below the temperature of the solution, and that, at the same time, a sufficient quantity of steam must escape from the solution to ensure that these walls shall have no material cooling effect upon the steam. These desiderata are all met by an arrangement employed by Prof. Sakurai, and described in the Journal of the College of Science, Imperial University, Japan, vol. vi., part i. From experiments on solutions of calcium chloride, sodium nitrate, and potassium nitrate, it appears that the temperature of the steam escaping from a boiling solution is exactly the same as that of the solution itself.

To measure the viscosity of liquids they are let flow, under given conditions of pressure and temperature, through a capillary tube, and the time of passage is determined. This is rather unsuitable for very viscous liquids, such as concentrated glycerine; and Herr Brodmann has devised a method (*Wied. Ann.*) for determining co-efficients of friction, where these exceed a thousand times that of water. The liquid flows by gravity through a vertical tube from a wide vessel above, filled to a certain height, into a small shallow vessel below, standing on one scale of a chemical balance, the other scale being weighted so that it is down. A time comes when this preponderance ceases. The moment of passage of a certain mark is noted, a weight is added to the weight-scale, and the process is repeated. The difference of time between two of these passages corresponds, after some corrections, to the direction of outflow of a quantity of liquid equal in mass to the added weight.

A NOTE in *Électricité* gives the substance of a letter to the Génie Civil, in which the correspondent shows that there is a difference of potential between the water and gas pipes in all houses, and that if one terminal of a telephone is joined, say, to the water-pipe, on lightly touching the gas-pipe with the other, a crackling sound is heard in the telephone indicating the passage of a current. By replacing the telephone by a galvanometer, it is found that the negative pole is formed by the gas-pipe, and that the galvanometer deflection is permanent and constant in amount during several months, though there is a slight diurnal variation. The author attributes these currents to a slow chemical change in the pipes, which thus form the plates of a battery. However, these observations suggested that the pipes must be fairly well insulated from each other, and might act as conductors for telephonic communication, and he has succeeded in carrying on a conversation, without any other connecting conductor between two houses at a distance of a hundred metres apart. In this experiment the microphone, without any induction coil, was joined to three bichromate cells. It is very easy to see if the experiment will succeed, as it is only necessary to set a small induction coil to work, joining its terminals to the water and gas-pipes, then in all neighbouring houses in which, on joining a telephone to the pipes, the sound of the coil is heard communication is good. Even if speech cannot be satisfactorily transmitted, it would be possible to communicate by the ordinary Morse signals.

A HIGHLY sensitive manometer, suitable for measuring small variations of high pressures, is described by M. Villard in No. 21 of the *Comptes Rendus*. It consists of a U-tube one or two mm. in diameter and about 20 cm. long, one end of which leads into a closed glass cylinder about 50 sq. mm. in section and 8 or 10 cm. long or longer, according to the degree of sensibility required. The other end opens into another wide tube ending in a narrower portion, which may be bent back. A narrow copper tube fixed inside this portion by about 3 cm. of marine glue forms a most efficient mouthpiece and offers an almost indefinitely large resistance to the passage of gaseous matter. Enough mercury is contained in the U-tube to fill one of its branches. The filling is to a great extent self-acting. The mouthpiece need only be connected to a compressed gas reservoir. The gas bubbles up through the narrow tube and fills the cylinder at the pressure required. A slight expansion subsequently enables the mercury to reenter the narrow tube, and the position of the thread of mercury is then read off on a scale. In one of the instruments constructed, which has a reservoir of 5 cc. capacity, a change of level of 1 mm. at 20 atmospheres corresponds to a change of pressure amounting to 1 in 2500, so that it may safely be said that at 50 atmospheres the same change of level indicates a change in pressure of one-fiftieth of an atmosphere. But this amount of sensitiveness may be increased by making the reservoir longer, and since it is possible to take readings to 0·1 mm., the instrument may be said to indicate differences as small as 1 in 25,000. The variation in height of the mercury must of course be allowed for, and the tube and reservoir accurately gauged before the instrument is set up. After use at a high pressure it can be opened to the air, when the compressed gas will escape in bubbles through the wide tube. It is found that the instrument is easily made strong enough to work with safety at 100 atmospheres.

A REPORT on "The Hawks and Owls of the United States," with special reference to the economic status of the various species, has been prepared by Dr. A. K. Fisher for the U.S. Department of Agriculture. Of the seventy-three species and sub-species described only six prove to be injurious, and three of those are extremely rare. The contents of about 2700 stomachs of hawks and owls were examined, and omitting the six species that feed largely on poultry and game, 56 per cent. contained mice and other small mammals, 27 per cent. insects, and only 3½ per cent. poultry or game birds. This result shows that a class of birds commonly looked upon as enemies to the farmer really rank among his best friends. The report contains twenty-five coloured plates.

AT a meeting of the Norfolk and Norwich Naturalists' Society, held on May 30, a resolution with regard to the Wild Birds Protection Bill now before the House of Lords was unanimously passed, and the president requested to forward the same to the Earl of Kimberley, one of the Vice-presidents, asking his cooperation with its objects. The result of the proposed amendments would be that the County Council should be empowered to order the protection of certain specified districts easily defined, rather than the eggs of specified species, which, in many instances, so closely resemble those of other species (as for instance, those of the Teal and Gargany Teal, and the Ruff and Redshank) that their identification would be so difficult to establish as to render a conviction practically impossible.

IN the fourth annual report of the Missouri Botanical Garden, which has just been published, Mr. W. Trelease gives the results of further studies of yuccas and their pollination. Mr. Albert S. Hitchcock also contributes a description of plants collected in the Bahamas, Jamaica, and Grand Cayman.

MESSRS. BLACKIE AND SON have added another to their already large number of science text-books. "Chemistry for All," by W. Jerome Harrison and R. J. Bailey, is a tersely-written account of the chemistry of common things, in which equations, formulæ, chemical symbols, and arithmetical calculations are eschewed. There is little new in the book, either in the text or illustrations.

MESSRS. MACMILLAN AND CO. have just published a fine work by Mr. G. W. Caldwell Hutchinson, entitled "Some Hints on Learning to Draw." A few excellent, though brief, remarks on elementary anatomy precede the description of drawing the human figure, but artists do not yet seem to realise the equal importance of knowing something about the elements of physical science before conceiving pictures of natural phenomena.

MESSRS. GAUTHIER-VILLARS have issued two small volumes by M. P. Minel on "L'Electricité Industrielle." One deals with potential lines of force and electro-magnetic units, and in the other, magnetic circuits and induction machines are considered. The object of the author has been to bring together the theoretical principles necessary to the proper understanding of dynamo-electric machinery and electric lighting.

A USEFUL little book by M. Henri Coupin on "L'Aquarium d'Eau Douce" has recently been published by Messrs. Baillière. It is well illustrated, and should be interesting to young naturalists. The author describes how to capture, preserve, and study some of the common types of plants and animals found in fresh water.

A TRANSLATION of Dr. Migula's "Introduction to Practical Bacteriology," by M. and H. J. Campbell, has just been published by Messrs. Swan Sonnenschein and Co. The German edition was reviewed in these columns on June 30, 1892.

THE Geological and Natural History Survey of Minnesota have issued their twentieth annual report. Among other papers contained in the report is one by Mr. N. H. Winchell on "The Crystalline Rocks, some preliminary considerations as to their Structure and Origin," and Dr. A. C. Lawson gives the results of a survey of the raised beaches of the north shore of Lake Superior.

A USEFUL syllabus of an elementary course of botany has been received from the author, J. Bentley Philip. It is published by James G. Bisset, of Aberdeen.

PROF. HERDMAN writes to us:—"During the Whitsuntide vacation the Liverpool Marine Biology Committee spent two days in dredging from Port Erin, and the rest of the time in work on the shore and in the Biological station. On one day the weather was sufficiently fine to allow of the steamer working on the seventy fathom depression which lies to the west of the Isle of Man, half way to the Irish coast. The bottom there is a fine stiff grey-blue mud or clay, which, it has been suggested, may be of glacial origin. We searched very carefully through dredgefuls of this unpleasantly tenaceous cold mud in the hope of finding some stones or shells which might settle the matter, but in vain. The animals on this ground include the Crustaceans *Calocaris macandreweæ* and *Pasiphæa sivado*, a Polynoid (*Panthalis oerstedi*) in enormous muddy tubes and *Lipobranchius jeffreysii*, Echinoderms *Amphiura chiajii* and *Brissopsis lyrifera* (in quantity), *Virgularia mirabilis*, and the Molluscs *Isocardia cor* and *Rissoa abyssicola*. On a previous trip, shortly before this, one of our party obtained fifteen living specimens of *Isocardia cor* on this ground. The rest of the dredging on the two days was carried on nearer Port Erin, along the west side of the Isle of Man, at depths of twelve to forty-six fathoms. Among the more noteworthy forms obtained were the Echinoderms *Thyone raphanus* and *Echinocardium flavescens*, a calcareous sponge *Ute glabra* (found before at Guernsey), the Ascidians *Eugyra glutinans*, *Polycarpa comata*, and a considerable number of the rare *Forbesella tessellata* (which present such variations in shape, general appearance, colour and texture, along with identity in anatomical characters, as to enable me to say that Forbes's *Cynthia tessellata* and *C. limacina* are undoubtedly one and the same species), and the mollusca *Oscanius membranaceus*, *Coryphella landsburgi*, and *Cyclostrema millepunctatum*, Friele, which is new to British seas. One of our reporters on Mollusca (Dr. Chaster) tells me that Canon Norman, who has seen our specimens of the *Cyclostrema*, and compared them with one of Herr Friele's type specimens in his collection, writes that the species has only been taken by the Norwegian North-Atlantic Expedition at Stat. 192 (Lat. 69°46′ N., Long. 16°15′ E.), off the northern part of Norway, at a depth of 649 fathoms. *Anomalocera pattersonii* was very conspicuous in the surface nettings, and additional specimens of the new *Lichomolgus* (L.

maximus, Thomps.) inhabiting *Pecten* were obtained, along with many other Copepoda which have not yet been examined."

Two further papers upon his researches with the electric furnace are contributed by M. Moissan to the current number of the *Comptes Rendus*. In the first it is shown that crystals of quartz and zircon are almost instantly fused at the high temperature of a powerful electric arc, the liquids brought to vigorous ebullition in a few moments and actually distilled, passing over into the receiver in the form of a dense fume. M. Moissan further demonstrates how easy it is at this high temperature to obtain pure zirconium and pure silicon by reduction of the liquefied oxides with carbon. The current employed was one of 360 ampères. When fragments of rock crystal were placed in the crucible of the furnace and subjected to the arc they rapidly melted, and in seven minutes the liquid boiled vigorously; the vapour of silicon dioxide which escaped condensed in the cooler portion of the furnace to a bluish-white fume, which deposited in the receiver in the form of small opalescent spheres, visible to the unaided eye. These spheres of silica were solid throughout, and usually exhibited a depression at some portion of the surface, indicating contraction upon passing from the liquid to the solid state. They were readily soluble in hydrofluoric acid. It is of interest that M. Moissan has discovered similar opalescent spheres of silica upon glass globes which have been employed in electric lighting to diffuse the light from arc lamps, indicating that slow volatilisation of the silica of the glass had occurred. It is doubtless to this cause that the opalescence which usually occurs after such globes have been in use for some time is due. The specific gravity of the spheres is 2·4, slightly less than that of quartz. At the temperature of the arc given by 360 ampères liquid silica is very readily reduced by carbon, a crystalline regulus of silicon being obtained containing more or less carbon.

WHEN zircons or any other form of zirconia are submitted to the high temperature of the same arc they likewise fuse, and in about ten minutes the liquid boils vigorously, and zirconium oxide passes over as a white fume into the receiver, where it condenses in the form of a white powder. Any liquid remaining in the crucible after switching off the current solidifies to a crystalline mass, and scattered about the walls of the furnace numerous perfect little artificial zircons are observed, identical in colour, lustre, and other properties with natural zircons. Both these and the powder condensed in the receiver readily scratch glass. Liquid zirconia, like silica, is readily reduced by carbon. If the oxide is fused by the arc in a carbon crucible, a button of metallic zirconium is found at the close of the operation beneath the residual solidified zirconia. If zirconia is mixed with powdered carbon a metal is obtained containing 4–5 per cent. of carbon. This carbide can be refined by re-melting with more zirconia when the pure metal is obtained. Zirconium is a very hard metal, readily scratching glass and ruby. Its density is 4·25.

THE second paper of M. Moissan describes the preparation of metallic tungsten, molybdenum, and vanadium. Tungsten is readily obtained in the form of powder by reduction of heated tungstic acid in a current of hydrogen, but the powder thus obtained has been hitherto found to be practically infusible. M. Moissan now shows that tungsten may be readily prepared in solid ingots in the electric furnace. A mixture of tungstic acid and carbon is placed in the crucible, and after ten minutes' subjection to an arc of the tension above stated a button of over a hundred grams of the metal is produced. If care has been taken to ensure excess of tungstic acid, pure tungsten is obtained in the one operation. Otherwise a carbide is obtained which requires refining by re-melting with a further quantity of tungstic acid. The tungsten thus obtained is a very brilliant metal of specific gravity 18·7. M. Moissan has further observed that if a much more powerful arc is employed, the percentage of carbon in the carbide of tungsten first obtained is very largely increased. Thus when a current of 1000 ampères was employed the percentage of carbon rose to 18, indicating an attempt to form a true binary compound. Metallic molybdenum has likewise been obtained by M. Moissan by the reduction of its oxide with powdered charcoal at the temperature of the arc afforded by a current of 360 ampères. The metal is not, however, quite free from carbon, and requires refining.

THE preparation of metallic vanadium has presented considerable difficulty. It will be remembered that Sir Henry Roscoe found it impracticable to reduce vanadic acid by carbon, and eventually isolated the pure metal by reduction of the dichloride in a stream of hydrogen. M. Moissan finds that even after twenty minutes' action of the arc from the 360 ampères current, only a trace of reduction is apparent at the surface of the mixture of oxide and charcoal. Upon increasing the tension of the arc by employing a current of a thousand ampères complete reduction occurs, but the metal produced combines, as in the case of tungsten, with a large quantity of carbon. It would appear, therefore, that at this high temperature these refractory metals combine with carbon to form definite binary compounds.

NOTES from the Marine Biological Station, Plymouth.—Last week's captures include the Actinians *Sagartia miniata* and *venusta*, the Nemertines *Amphiporus hastatus* and *Malacobdella grossa*, the Polychæte *Myrianida maculata* (with a posteriorly proliferated chain of buds), and the Schizopods *Siriella frontalis* and *jaltensis*, the latter species in considerable numbers. Floating Cœlenterates have been particularly plentiful. Medusæ of *Aurelia aurita* (now 4 to 7 ins. in diameter) have frequently been noticed. The Anthomedusæ have been represented by *Sarsia tubulosa*, *Bougainvillea ramosa*, and, more plentifully, by *Amphinema Titania*; the Leptomedusæ by countless numbers of *Phialidium variabile*, together with a smaller proportion of *Thaumantias Thompsoni* (Forbes) and *Laodice cruciata*, Ag. (= *T. pilosella*, Forbes). A few young *Clytia* medusæ have been occasionally taken, but *Obelia* medusæ have been very scarce. The Ctenophore *Hormiphora plumosa*, in various stages of growth, is now abundant. Several specimens of the parasitic larva of the Actinian *Halcampa chrysanthellum* have been taken. The beautiful veliger *Echinospira diaphana* has once been noticed; larvæ of the Crustacean *Porcellana* are plentiful. The following animals are now breeding:—The Hydroid *Clava cornea*, the Mollusca *Murex erinaceus* and *Aplysia punctata*, the Schizopoda *Macromysis inermis* and *Siriella jaltensis*, the Decapod *Palæmonetes vulgaris*, and the Echinoderm *Asterina gibbosa*.

THE additions to the Zoological Society's Gardens during the past week include a Barbary Ape (*Macacus inuus*, ♀) from North Africa, presented by Mr. A. G. F. Dashwood; a Suricate (*Suricata tetradactyla*) from South Africa, presented by Mr. L. V. Harcourt; three Chinese Quails (*Coturnix chinensis*, ♂ ♀ ♀) from China, presented by Mr. W. J. Ingram; two Kingfishers (*Alcedo ispida*) British, presented by Mr. A. K. Dixon; a Harlequin Snake (*Elaps fulvins*) from Florida, presented by Mr. C. Ernest Brewerton; a Horned Lizard (*Phrynosoma cornutum*) from Texas, presented by Mr. J. Harland Coates; a Sykes's Monkey (*Cercopithecus albigularis*, ♀) from East Africa, a Leucoryx (*Oryx leucoryx*, ♀) from North Africa, a Mexican Deer (*Cariacus mexicanus*, ♂) from Mexico, a Malayan Tapir (*Tapirus indicus*, ♂) from Malacca, two Common Cassowaries (*Casuarius galeatus*, jr.) from Ceram, a Leopard Tortoise (*Testudo pardalis*), two Derbian Zonures (*Zonurus derbianus*) from South Africa, deposited; two Brazilian Cariamas (*Cariama cristata*) from Brazil, four Black-tailed Godwits

(*Limosa ægocephala*) four Flamingoes (*Phænicopterus antiquorum*) European, purchased; a Barbary Wild Sheep (*Ovis tragelaphus*, ♂), an Angora Goat (*Capra hircus*, ♀ var.), a Japanese Deer (*Cervus sika*, ♀), a Great Kangaroo (*Macropus giganteus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE TOTAL SOLAR ECLIPSE (April, 1893).—M. N. Coculesco, in the current number of the *Comptes Rendus* (No. 22) gives a brief account of his observations made during the last total solar eclipse. The station he occupied was at Fundium. The instruments which he took with him consisted of a telescope of 0·16 m. aperture, with a wooden mounting, a fine comet seeker, a mean time chronometer, and a thermometer. An ordinary photographic camera fixed to the telescope was also employed, five fine negatives of the corona being obtained with it. The plates employed were the ordinary dry plates of gelatine-bromide of silver, and the developer that of ferrous-oxlate. The exposures were of 2, 4, 6, 7, and 5 seconds duration, but the second plate seems to have given the most details. The observation of contacts gave the following results:—

Observation.	Paris M. T. h.	m.	s.
1st contact	2	20	21
2nd ,, ...	3	42	51
3rd ,, ...	3	47	2
4th ,, ...	5	3	36

thus giving 4m. 11s. as the duration of totality. The thermometrical observations showed that on the day of the eclipse the temperature was + 28° C., at the commencement of totality 26°·6, middle of totality 24°·0, and at the end of the eclipse 26°·5. A fall of from 3½° to 4° was thus noticed from the commencement of the eclipse to the middle of totality.

METEOR OBSERVATIONS.—Mr. Denning, in the *Observatory* for June, has a note on the large meteor of April 15, 1893, and also notes on observations of fireballs. With reference to the latter he points out those observations are made by a number of casual observers, and are commonly found to be conflicting and incomplete, the accounts being based on "rough hurried impressions often vitiated by serious errors." In attempting to reduce such observations it is generally found impossible to accommodate the descriptions unless we assume that the several large meteors appeared simultaneously in different paths. These bodies, he says, deserve closer attention than is usually given to them, and accurate observations should be made with regard to their positions, directions, and durations of their flights among the stars. That meteoric astronomy would advance by rapid strides, and that many "moot points in the visible behaviour of meteor-streams would soon receive settlement" cannot for a moment be doubted.

The study of brilliant meteors is one that requires no instrument but simply a good star atlas, and we hope that many of our readers may take Mr. Denning's words to heart and try to elevate this important branch of astronomy so that it can no longer be said that "they come and go, and their transient glories serve no more important end than that of affording startling spectacles to those who are fortunate enough to witness them."

WASHBURN OBSERVATIONS.—In vol. vi. part 3 of the Publications of the Washburn Observatory are the results of the observations made by Mr. Sidney Dean Townley of telescopic variable stars of long period. The method employed was to select two stars for comparison, one slightly brighter and the other slightly fainter than the one to be measured, the difference between these two comparison stars in brightness being less than a magnitude. By this means a very accurate estimation can be made of the brightness of the star in tenths of the interval between those taken for comparison. In estimating the magnitudes of the comparison stars he has employed the limit of visibility of the finder and large telescope (apertures 8·9 cm. and 39·5 cm. respectively), commencing with the former, and going down the numerical scale. The method of recording the values obtained is similar to the notation used by Argelander and Herschel Thus of two comparison stars *a* and *b*, *a* 1 *b* shows that the star observed is very nearly as bright as *a*, while *a* 9 *b* shows that it is very nearly equal in brightness to *b*, the number 1 representing one-tenth of the difference of brightness between the two comparison stars. In the tables, the number of the stars, together with their R.A.'s and declinations, are taken from Chandler's "Catalogue of Variable Stars." About 36 variables are included in this work, the observations extending over the period 1889-1892.

FINLAY'S COMET (1886 VII.).—Comet Finlay is described as circular, 1′ in diameter, 11th magnitude, very diffuse, and with no tail. As it rises just before the morning twilight in this country, it is by no means in a good position for observation. The following ephemeris is taken from a continuation of M. Schulhof's computations, made by M. Coniel, the difference between the computed and observed places being approximately—1m. 43s. in R.A. and + 12′ N.P.D.

M. T. Paris.

1893.	R.A. app. h.	m.	s.	Decl. app. °	′
June 8 ...	1	12	56	... +4	40·6
9 ...		17	35	... 5	9·9
10 ...		22	15	... 5	39·1
11 ...		26	56	... 6	8·2
12 ...		31	38	... 6	37·1
13 ...		36	20	... 7	5·9
14 ...		41	3	... 7	34·5
15 ...	1	45	47	... +8	2·9

GEOGRAPHICAL NOTES.

AT the last meeting of the Royal Geographical Society, Dr. Joseph A. Moloney, medical officer to Capt. Stairs' expedition to Katanga, read a paper descriptive of the journey. The expedition of over 300 men landed at Bagamoyo on June 27, 1891, and marched to Lake Tanganyika through the German territory, following the well-known caravan-track through Tabora. On the way proofs were not wanting that the slave-traders were kept well supplied with gunpowder, in spite of the strict regulations which are made much of in Europe. On October 9 they reached Lake Tanganyika near its southern end, and from conversations with the missionaries and natives obtained some interesting information as to the variations in the level of the water. It appears that the outlet of the lake by the Lukuga becomes periodically choked by sand and vegetation, thus forming a natural dam, which causes the level of the lake to rise. After a time the barrier is carried away and the river issues with great force, flowing strongly for a number of years. The extreme difference in level must be about 18 feet, and the rise and fall probably occupy about fifteen years. On October 31 the caravan started from the west side of the lake. The Kaomba country first passed through was found to abound in minerals, iron and copper being extensively worked by the natives who show much skill in the manufacture of weapons and implements. Bunkeia, the capital of Msiri's territory, was reached on December 14, the journey having been of extraordinary rapidity considering the route taken. Much of the country was swampy, and there were tracts of dense tropical forests reminding Captain Stairs of the Aruwimi basin. Near Bunkeia a famine was raging, and this, together with the tragedies consequent on the conquest of Msiri, brought the expedition into a very bad state. All the Europeans except Dr. Moloney suffered severely, and Captain Stairs never fully recovered. On February 4, 1892, the survivors of the expedition set out on the return journey, and travelling by Lake Nyasa and the Shire reached the Chinde mouth of the Zambesi on June 4.

JUDGE DALY, President of the American Geographical Society, devoted his anniversary address, which has just been published, to a critical study of the portraits of Columbus. He believes that several of those popularly held to be authentic are really original paintings from the life, but the Lotto portrait which has been multiplied indefinitely by the United States Government on commemoration coins and postage stamps he looks on as of very doubtful value.

MR. CARL LUMHOLTZ publishes a letter from North Mexico in the last number of the *Bulletin* of the American Geographical Society, in which he gives some account of his studies of the Tarahumare Indians, who are cave-dwellers although not apparently connected with the ancient cave and cliff-dwellers of the United States. Mr. Lumholtz was engaged in taking down the language, and in making anthropometric measurements of this little-known tribe.